

30-Day Launch Forecast

3 August 2000

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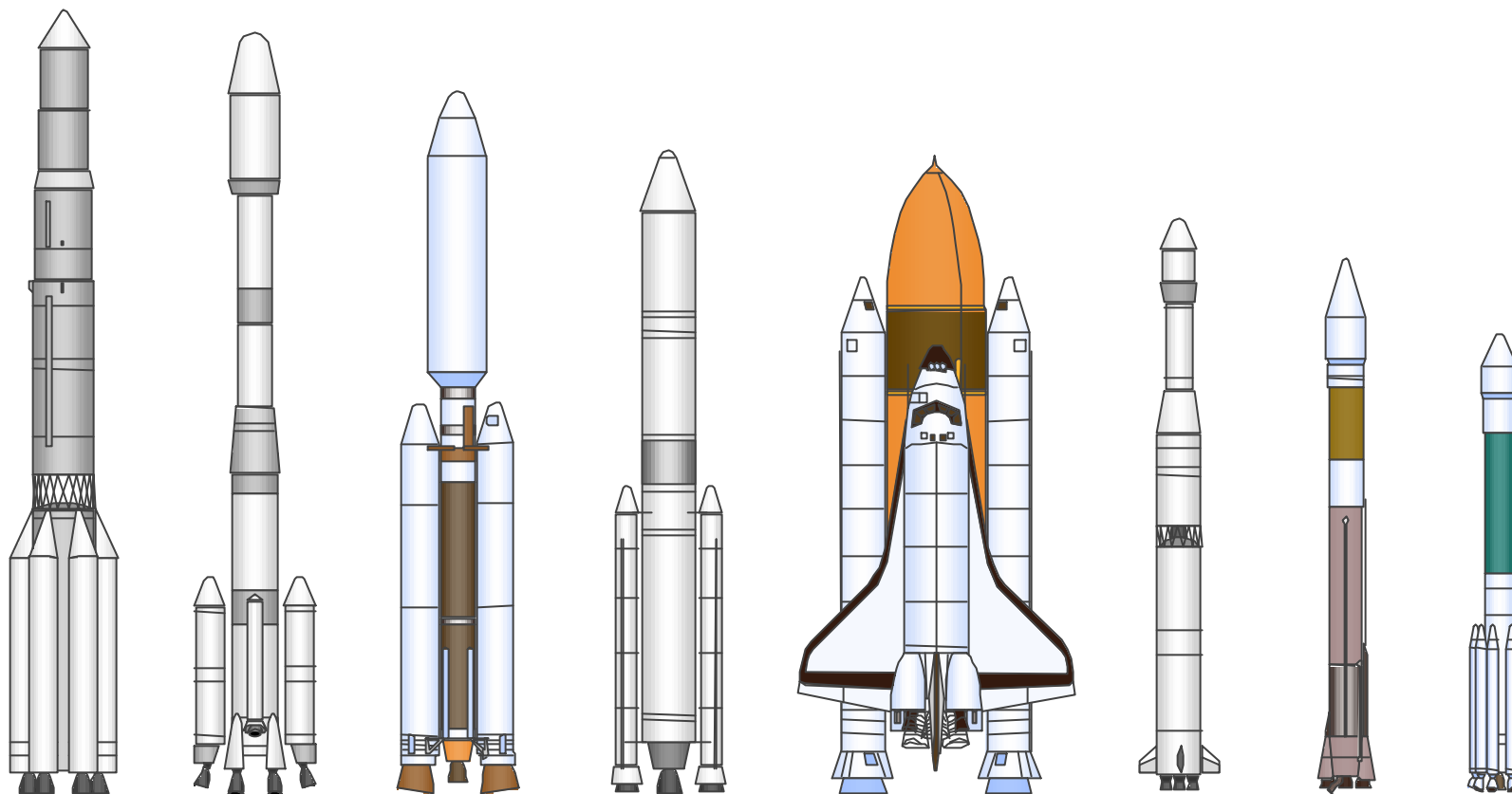
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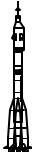






ANSER Space Analysis Division

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30-Day Launch Forecast

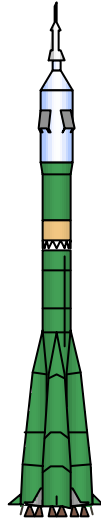
(03 August 2000 - 01 September 2000)

Mon	Tue	Wed	Thu	Fri	Sat	Sun	Comments / Schedule Changes										
A Look Ahead 08 Sep STS-106 14 Sep Titan 2 18 Sep Sea Launch 21 Sep Soyuz-U 24 Sep Zenit 2 28 Sep Minuteman III 28 Sep Minuteman III All foreign launches presented in this forecast are unofficial			3	4	5	6  Soyuz-U Progress M1 Baikonur 1422 EDT	Soyuz-U / Progress M1-3 • Resupply for ISS Soyuz-Fregat / Cluster II • Second pair of four identically instrumented science satellites sponsored by ESA										
7	8	9  Soyuz-Fregat Cluster II Baikonur 0711 EDT	10	11	12	13	Titan 4B / NRO; Mission B-28 • Classified military satellite • No Upper Stage (NUS/403 configuration)										
14	15	16  Titan 4B NRO SLC-4E VAFB 1800-2200 EDT	17  Ariane 44LP Brasilsat B-4 Nilesat 102 ELA-2 CSG TBD EDT	18	19	20	Ariane 44LP / Brasilsat B-4 / Nilesat 102; Flight 131 • Brasilsat B-4: Brazilian communications satellite • Nilesat 102: Egyptian communications satellite Delta 3 / DM-F3; Flight 280 • Demonstration flight with dummy payload to prove vehicle flightworthiness										
21	22	23  Delta 3 DM-F3 SLC-17B CCAFS 0900-1300 EDT	24	25  Dnepr Saudisat 1-A & 1-B Baikonur TBD EDT	26	27	Dnepr / Saudisat 1-A & 1-B / UNISAT / Megsat 1 / TiungSat 1 • Saudisat: Saudi Institute for Space Research • UNISAT: University of Rome microsatellite • Megsat 1: Italian data relay satellite • TiungSat 1: Malaysian remote sensing payload										
28	29	30	31	1 Sep	Last Week's Launch Activities <table><tr><th>Date</th><th>Vehicle</th><th>Payload</th><th>Site</th><th>Type</th></tr><tr><td>28 Jul</td><td>Sea Launch</td><td>PAS-9</td><td>Pacific Ocean</td><td>Communications</td></tr></table>			Date	Vehicle	Payload	Site	Type	28 Jul	Sea Launch	PAS-9	Pacific Ocean	Communications
Date	Vehicle	Payload	Site	Type													
28 Jul	Sea Launch	PAS-9	Pacific Ocean	Communications													
Launch Date provided in Universal Time																	

Launch Date provided in Universal Time

Acronyms: VAFB - Vandenberg AFB CA CCAFS - Cape Canaveral AFS FL KSC - Kennedy Space Center FL CSLF - Calif. Space Launch Facility NET - No Earlier Than WFF - Wallops Flight Facility
 SLC - Space Launch Complex LC - Launch Complex LF - Launch Facility EDT - Eastern Daylight Time EST - Eastern Standard Time CSG - Guiana Space Center

Soyuz-U



Current Mission Specifics

551st launch of a Soyuz Launch Vehicle since 1980

Reliability History (since 1980)

- 537 successes in 550 attempts

Typical Launch Sequence

- | | |
|----------------------------|---------|
| • Lift off | 0 sec |
| • Strap-ons separate | 118 sec |
| • Payload fairing jettison | 160 sec |
| • Core stage 1 separation | 286 sec |
| • Orbit Injection | 540 sec |

Payload Weight: Progress M1; 16,095 lb (at launch)

Orbit: 210 nm circular, 51.6° inclination

Next Soyuz launch

- 9 August 2000 / Cluster II

Background Information

First Launch:	November 1963
Flight Rate:	45 per year (maximum recorded launch rate)
Launch Site:	Plesetsk, Russia; Baikonur, Kazakhstan
Capability:	15,400 lb to LEO

History

- Developed from the Vostok Launch Vehicle originally derived from the SS-6 (Sapwood) ICBM.
- Used to launch every former Soviet Union piloted spacecraft since 1964.
- Also used to launch photo reconnaissance satellites, earth resource satellites, and Progress resupply missions to the Mir space station.

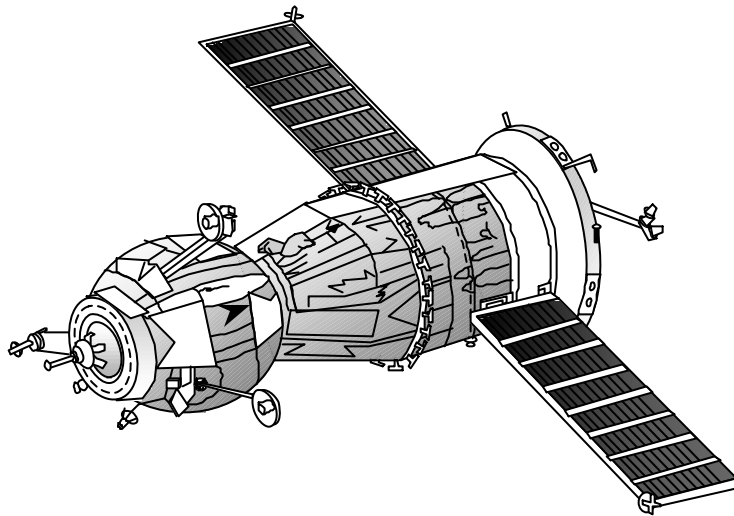
Description

- Two-stage (plus 4 strap-ons) liquid fueled vehicle.
- Stage 1 core has one RD-108 booster engine (one turbopump with four separate combustion chambers) burning LOX/kerosene fed from stage 1 tanks, generating 220,050 lb of thrust.
- Four Stage 1 strap-ons each have one RD-107 engine (one turbopump with four separate combustion chambers) burning LOX/kerosene fed from stage 1 tank, generating a total of 227,925 lb of thrust each.
- Stage 2 has one RD-0110 Block 1 engine burning LOX/kerosene, generating 67,050 lb of thrust.
- Starsem version only: Fregat restartable upper stage powered by a single-chamber Lavochkin engine engine burning UDMH/N₂O₄, generating 4,410 lb of vacuum thrust.

Profile

Length:	162.5 ft	Launch Weight:	682,765 lb
Diameter:	33.8 ft	Liftoff Thrust:	1,334,700 lb
Payload Fairing:	37.3 ft x 9.8 ft		

Progress-M1



Spacecraft Specifications

Total Weight:

- 16,095 lb (at launch)

Dimensions:

- Total Length: 23.7 ft
- Diameter: 7.2 ft
- Solar Arrays: 107.6 ft²

Progress-M1

Unmanned Russian space station resupply ferry.

Mission

Deliver removable cargo such as experimental equipment, food, water, and air regeneration cylinders as well as propellants and compressed gases to the International Space Station (ISS).

Description

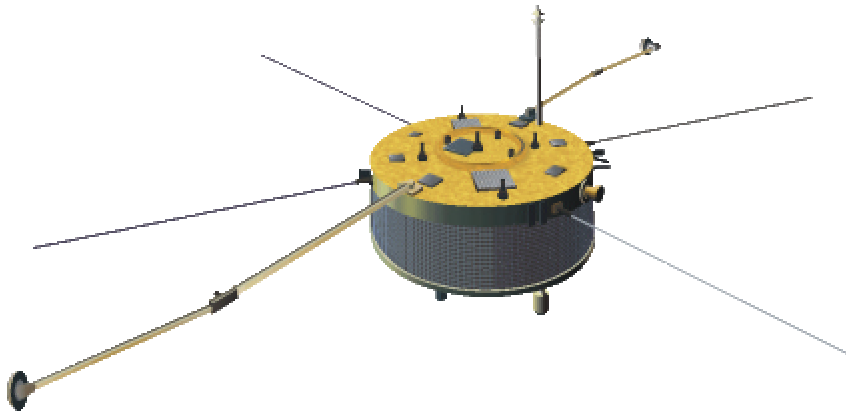
Spacecraft Description:

- Crew-accessible cargo compartment; mid-section compartment for fuel components; aft section instrument assembly module.
- Carries 3,970 lb of consumables in cargo compartment and 2,072 lb of fuel in mid-section (UDMH/NTO and O₂).
- TM-type solar arrays generating 1.3 kW; batteries carried in pressurized instrument package augment Mir when docked.
- Docks with ISS employing Kurs ('course') approach system; station crew docking assist available.
- Navigation computations performed by mission control and uplinked for execution.
- Raduga conical-cylindrical re-entry capsule used to return film and experimental samples; separates during re-entry for parachute recovery.
- Design life: 1 time use only (destructive re-entry over Pacific Ocean).

Orbit: 210 nm circular, 51.6° inclination

Prime Contractor: RKK Energia

Cluster II



Spacecraft Specifications

Weight:

- 2,645 lb (at launch)
- 1,213 lb (dry mass)

Dimensions:

- Height: 4.3 ft
- Diameter: 9.5 ft

Cluster II

Second pair of four identical satellites that will fly in formation. Cluster II is one of ESA's top priority Cornerstone science missions, and replaces the original Cluster mission that was destroyed during the failed maiden launch of the Ariane 5 rocket in June 1996.

Mission

Study the interaction between the the solar wind and the Earth's magnetosphere allowing for the first time truly three-dimensional measurements of both large- and small-scale phenomena in the near-Earth environment.

Description

Spacecraft Description:

- Spin-stabilized cylindrical bus; orbit/attitude maintenance performed by semi-radial and axial control thrusters together with the main engine.
- Each satellite carries an identical set of 11 instruments mounted to the Main Equipment Platform.
- Power: 224 W provided by six curved solar-array panels; five 80 Ah Silver Cadmium batteries provide eclipse protection.
- Carries two 5 meter-long experiment booms, four 50 meter-long wire booms, and two antenna booms.
- Telemetry downlink bit rate 2 to 262 kbit/s.
- Design life: 2 years.

Orbit: Highly eccentric polar orbits ranging from 13,510 to 67,555 nm at 64.8° - 90° inclination

Prime Contractor: Dornier

Titan 4B



Current Mission Specifics

30th launch of the Titan 4 launch vehicle

Reliability History:

- Titan 4-A: 20 successes in 22 attempts
- Titan 4-B: 5 successes in 7 attempts

Typical Launch Sequence

• Stage 0 Ignition	0	sec
• Stage 1 Ignition	120	sec
• Stage 0 Separation	152	sec
• Payload Fairing Separation	230	sec
• Stage 2 Ignition	308	sec
• Stage 1 Separation	309	sec
• Stage 2 Shutdown	532	sec
• Stage 2 Jettison	558	sec

Payload Weight: Classified NRO (B-28); N/A

Next Titan 4B launch

- 31 October 2000 / Milstar-4 (B-41)

Background Information

First Launch:	February 1997
Flight Rate:	3-4 per year
Launch Sites:	SLC-40 & SLC-41 (CCAFS, USA); SLC-4E (VAFB, USA)
Capability:	48,280 lb to LEO; 39,000 lb to polar LEO; 19,000 lb to GTO; 12,725 lb to GEO (with Centaur)

History

- USAF Titan ICBM program started in 1950s.
- Titan 4 program started as Complimentary Expendable Launch Vehicle (CELV).
- Direct descendant of Titan 34D.
- Titan 4B program adds Solid Rocket Motor Upgrade. SRMU changes from SRM: increases payload mass capability by 25%, graphite composite casing (vs steel), HTPB (vs PBAN), 3 field joints (vs 7), 12% heavier, 5% wider.

Description

- Two or three-stage (including Centaur or IUS) vehicle plus two strap-ons.
- Stage 0: Two 3-segment Alliant Techsystems SRMUs, generate 1,701,450 lb of thrust each.
- Stage 1: Two Aerojet LR-87 engines burn $N_2O_4/A-50$, generating 547,605 lb of thrust total.
- Stage 2: One Aerojet LR-91 engine burns $N_2O_4/A-50$, generating 106,200 lb of thrust.
- Centaur upper stage uses two Pratt & Whitney RL10-3-3A engines burning LOX/LH₂ producing 33,000 lb of total thrust.
- Titan 4 available in three configurations: Titan 401/Centaur Upper Stage; Titan 402/Inertial Upper Stage (IUS); Titan 403/No Upper Stage (NUS).

Profile

Length:	204 ft	Launch Weight:	2,070,785 lb (Centaur)
Diameter:	10 ft	Liftoff Thrust:	3,402,900 lb
Payload Fairing:	56 (NUS), 66 (IUS), 76 (IUS), and 86 (Centaur) ft x 16 ft		

Space Launch Activities

2000 Year To Date

United States Launches

<u>Date</u>	<u>Vehicle</u>	<u>Payload</u>	<u>Site</u>	<u>Type</u>
18 Jan	Minuteman II	IFT-4	VAFB, LF-03	Missile Defense (MIL)
21 Jan	Atlas 2A	DSCS-B8	CCAFS, SLC-36A	Communications (MIL)
27 Jan	Minotaur	JAWSAT	VAFB, SLC-7	Technology Demo (MIL)
03 Feb	Atlas 2AS	Hispasat 1-C	CCAFS, SLC-36B	Communications (COM)
08 Feb	Delta 2	Globalstar-14	CCAFS, SLC-17B	Communications (COM)
11 Feb	STS-99	SRTM	KSC, LC-39A	Radar Mapping (CIV)
08 Mar	Peacekeeper	GT-29-PA	VAFB, LF-05	FOT&E (MIL)
12 Mar	Taurus	MTI	VAFB, 576-E	Technology Demo (MIL)
12 Mar*	Sea Launch	ICO F-1	Pacific Ocean	Communications (COM)
25 Mar	Delta 2	IMAGE	VAFB, SLC-2W	Science (CIV)
03 May	Atlas 2A	GOES-L	CCAFS, SLC-36A	Meteorology (CIV)
08 May	Titan 4B	DSP-20	CCAFS, SLC-40	Early Warning (MIL)
11 May	Delta 2	GPS IIR-4	CCAFS, SLC-17A	Navigation (MIL)
19 May	STS-101	ISS 2A.2a	KSC, LC-39A	ISS Resupply (CIV)
24 May	Minuteman III	FTM-02	VAFB, LF-09	Flight Test Missile (MIL)
24 May	Atlas 3A	Eutelsat-W4	CCAFS, SLC-36B	Communications (COM)
07 Jun	Pegasus XL	TSX-5	VAFB	Science (MIL)
09 Jun	Minuteman III	GT-172-GM	VAFB, LF-10	FOT&E (MIL)
30 Jun	Atlas 2A	TDRS-H	CCAFS, SLC-36A	Communications (CIV)
08 Jul	Minuteman II	IFT-5	VAFB, LF-03	Missile Defense (MIL)
14 Jul	Atlas 2AS	EchoStar-6	CCAFS, SLC-36B	Communications (COM)
16 Jul	Delta 2	GPS IIR-5	CCAFS, SLC-17A	Navigation (MIL)
19 Jul	Minotaur	MightySat II.1	VAFB, CSLF	Technology Demo (MIL)
28 Jul	Sea Launch	PAS-9	Pacific Ocean	Communications (COM)

French Launches

<u>Date</u>	<u>Vehicle</u>	<u>Payload</u>	<u>Site</u>	<u>Type</u>
25 Jan	Ariane 42L	Galaxy-10R	CSG, ELA-2	Communications (COM)
18 Feb	Ariane 44LP	SUPERBIRD-4	CSG, ELA-2	Communications (COM)
21 Mar	Ariane 505	INSAT-3B/ AsiaStar	CSG, ELA-3	Communications (COM)
19 Apr	Ariane 42L	Galaxy 4-R	CSG, ELA-2	Communications (COM)

Chinese Launches

<u>Date</u>	<u>Vehicle</u>	<u>Payload</u>	<u>Site</u>	<u>Type</u>
25 Jan	LM 3A	Zhongxing-22	Xichang	Communications (CIV)
25 Jun	LM 3	Fengyun-2B	Xichang	Meteorological (CIV)

Indian Launches

<u>Date</u>	<u>Vehicle</u>	<u>Payload</u>	<u>Site</u>	<u>Type</u>
No Launches to Date				

Japanese Launches

<u>Date</u>	<u>Vehicle</u>	<u>Payload</u>	<u>Site</u>	<u>Type</u>
10 Feb*	M-5	ASTRO-E	Kagoshima	Science (CIV)

Brazilian Launches

<u>Date</u>	<u>Vehicle</u>	<u>Payload</u>	<u>Site</u>	<u>Type</u>
No Launches to Date				

* Indicates Launch Failure
Launch Date provided in Universal Time

Space Launch Activities

2000 Year To Date

Russian Launches

<u>Date</u>	<u>Vehicle</u>	<u>Payload</u>	<u>Site</u>	<u>Type</u>
01 Feb	Soyuz-U	Progress M1-1	Baikonur	Mir Resupply (CIV)
03 Feb	Zenit 2	Cosmos 2369	Baikonur	Signal Intelligence (MIL)
08 Feb	Soyuz-Fregat	IRDT	Baikonur	Technology Demo (COM)
12 Feb	Proton	Garuda-1	Baikonur	Communications (COM)
12 Mar	Proton	Express-6A	Baikonur	Communications (CIV)
20 Mar	Soyuz-Fregat	Dumsat	Baikonur	Technology Demo (COM)
04 Apr	Soyuz-U	Soyuz TM-30	Baikonur	Mir Resupply (CIV)
17 Apr	Proton	SESat	Baikonur	Communications (COM)
25 Apr	Soyuz-U	Progress M1-2	Baikonur	Mir Resupply (CIV)
03 May	Soyuz-U	Cosmos 2370	Baikonur	Classified (MIL)
16 May	Eurockot	SIMSAT-1 & -2	Plesetsk	Demo Flight (COM)
06 Jun	Proton	Gorizont-45	Baikonur	Communications (CIV)
24 Jun	Proton	Express-3A	Baikonur	Communications (CIV)
28 Jun	Kosmos 3M	Nadezhda/ Tsinghua-1/ SNAP-1	Plesetsk	Navigation (CIV) Remote Sensing (CIV) Technology Demo (CIV)
30 Jun	Proton	Sirius-1	Baikonur	Communications (COM)
04 Jul	Proton	Cosmos 2371	Baikonur	Data Relay (MIL)
12 Jul	Proton	Zvezda	Baikonur	ISS (CIV)
15 Jul	Kosmos 3M	CHAMP/ MITA/ RUBIN	Plesetsk	Science (CIV) Technology Demo (CIV) Science (CIV)
16 Jul	Soyuz-Fregat	Cluster II	Baikonur	Science (CIV)

Launch Market Analysis

By Country

	<u># of Launches</u>	<u>Percent of Market</u>
US	13	35.1%
Russia	17	45.9%
France	4	10.8%
China	2	5.4%
Japan	1	2.7%

By Mission

	<u># of Launches</u>	<u>Percent of Market</u>
US Military	4	10.8%
US Civil	3	8.1%
US Commercial	6	16.2%
World Military	3	8.1%
World Civil	11	29.7%
World Commercial	10	27.0%

By Orbit Type (Commercial Only)

<u>GEO</u>	<u># of Launches</u>	<u>Percent of Market</u>
US	4	40.0%
Russia	2	20.0%
France	4	40.0%
China	0	0.0%
Japan	0	0.0%

<u>LEO</u>	<u># of Launches</u>	<u>Percent of Market</u>
US	2	33.3%
Russia	4	66.7%
France	0	0.0%
China	0	0.0%
Japan	0	0.0%

Figures Do Not Include US Space Shuttle, Small Launch Vehicles, or ICBM launches

* Indicates Launch Failure

Launch Date provided in Universal Time

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